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SUBJECT: What is a Traverse? / Case 320

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(NASA-CR-111183) WHAT IS A TRAVERSE /QUES/ (Bellcomm, Inc.) 2 p

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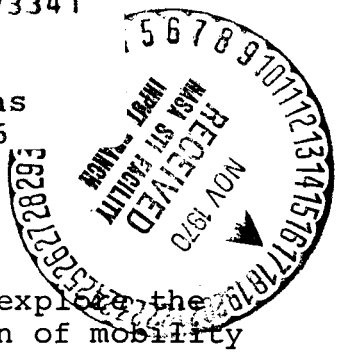

MEMORANDUM FOR FILE

As the capability of the astronauts to explore the lunar surface has expanded due to the introduction of mobility aids and larger life support systems, emphasis upon the traverse as a mechanism for this exploration process has increased. Various concepts of the nature, scope, and purpose of a traverse have developed, and it may be of value, in the midst of the process of traverse planning, to reflect upon the traverse as an exploration mechanism. One person's view is given here.

One may discuss traverses as two separate entities - the planned traverse and the actual traverse. The former is a series of lines drawn on a map or photographic base. It is the plan of action for exploring a portion of the lunar surface. The actual traverse is the implementation of that plan - the actual path and sequence of activities finally undertaken by the astronauts on the moon. These two traverses are hopefully similar, but certainly not identical.

The width of a pencil line on most photomaps corresponds to a swath on the lunar surface several times the width of the LRV. In addition, the resolution of most lunar surface photography does not permit the traverse planner to distinguish many of the objects and terrain features which the LRV will presumably avoid. The traverse planner will often not be able to identify hills or craters which will be circumvented by the LRV, and when he can distinguish these features he may have great difficulty in determining whether their slopes are compatible with preferred modes of LRV operation. Further, the traverse designer has only minimal knowledge of variations in lunar soil characteristics along the planned path, a factor which may be expected to have significant impact upon the path actually followed by the LRV. Thus traverse lines are more properly regarded as pre-mission estimates of the best probable path between two points than as detailed descriptions of which crater to skirt on the north edge and which on the south.

Traverse stations are equally indistinct. Although the traverse planner specifies a particular point on the map as the place at which samples should be obtained, this is again only a best guess based upon a very limited set of data on terrain and detailed geologic relationships. Each sta-

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tion is chosen for a particular purpose - to sample a given geologic unit, to observe an intersection relation, or to obtain material exhumed from depth. When reaching the designated area the astronaut may find the local terrain impassable, preventing access to the station, or he may discover that the station objectives can be better achieved by sampling at some other nearby location. It is then incumbent upon him, in coordination with advice from the ground, to alter the prescribed plan to obtain the best possible return consistent with his observations. It is for this very reason that men, rather than machines, are so valuable for lunar exploration.

The planned traverse is part of a set of basic guidelines required by the astronaut to perform his exploration of the lunar surface. It tells him in what areas he is most likely to achieve the scientific objectives of the mission and indicates the amount of time which should be spent at an individual station consistent with the broad objectives at the landing site. Since all pre-mission analyses have been performed using the planned traverse as a basis, general adherence to this traverse increases confidence that consumables budgets will be adequate, that all operational constraints will be obeyed, and that the allocation of activities will match the scientific objectives.

Thus the planned traverse path is not the required line of travel on the lunar surface, but rather the suggested manner in which the area between two stations can be traversed most easily, based upon limited photographic interpretation. Similarly a planned traverse station is not a specific point upon the lunar surface from which samples are to be obtained, but rather an area within which a specific set of objectives are to be accomplished in order to answer particular questions. A planned traverse is a guide rather than a constraint; a suggestion rather than a requirement. This does not imply that the astronaut should be free to wander aimlessly over the lunar surface, but that emphasis should be placed upon his judgement of terrain and geology in situ, with real time help from the ground, and within the general outline of the planned traverse. The planned traverse is the script, but ad libbing is preferred in the actual traverse.

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